RECLAMATION
Managing Water in the West
U.S. Department of the Interior
Bureau of Reclamation

WATER PRIZE COMPETITION CENTER

Pathogen Monitoring for Potable Water Reuse: Stage 1

When: Planned Launch Summer 2017

Problem Statement: As western U.S. water demands grow and water supplies become more scarce, water reuse is becoming an increasingly important water management strategy. Wastewater is a drought-resistant and reliable water source that is readily available in urban centers for beneficial reuse. In particular, potable reuse, both direct and indirect, is recognized by several states (e.g., California, Texas, and Arizona) as necessary for meeting future water needs. While advanced water treatment technologies exist to produce high quality, potable water from wastewater, there is a need to better ensure treatment process integrity through improved pathogen detection and monitoring. Waterborne pathogens (e.g., bacteria, viruses, protozoa, and helminths) are regulated due to the risk they pose to human health, and their presence must be limited in water intended for potable use. In order to facilitate regulatory and public acceptance of direct and indirect potable reuse, it is necessary to develop techniques for rapid detection of pathogens. Viruses are a priority for improved monitoring as they have the greatest pathogen reduction requirements (e.g., 12 log reduction in California for indirect potable reuse) and are difficult to remove and detect. Therefore, monitoring viruses represents a conservative approach to pathogen monitoring.

Virus monitoring could be improved by reducing response times for direct measurements, by identifying robust surrogate monitoring techniques, or by identifying appropriate indicator organisms. Measurement response time impacts potable reuse treatment plant design and operation. Most direct pathogen detection methods have turnaround times on the order of days due to sample collection, transport, and analysis times. Due to the public health risk, these long response times and the lack of on-site, real-time pathogen monitoring lead to cost-inefficient operations and increased treated water storage requirements. The integrity of some processes is monitored via surrogate techniques; for example, microfiltration is monitored by frequent pressure decay tests. For other processes, continuous monitoring of process performance is either not available or has limited sensitivity. As a result, a log reduction regulatory credit system has been developed for validated water treatment technologies. Pathogen monitoring would increase confidence in these process control measures.

The Solution We Seek: We seek to enable the development of rapid, more accurate, and preferably on-line/on-site monitoring techniques to provide added protection of public health and optimize the design and operations of advanced water treatment facilities. Success could result in reliable, effective pathogen detection technologies that can facilitate public and regulatory acceptance of direct potable reuse systems.

Prize Competition Scope: Stage 1 of the competition is seeking technical proposals for how to rapidly, accurately, and cost-effectively detect viruses in water reuse treatment plants. Reclamation will fund a $40,000 prize purse to be split among winning U.S. eligible solvers, and Xylem, Inc. will fund a $40,000 prize purse to be split among winning international eligible solvers. The judging panel may be composed of Federal and/or non-Federal scientists, engineers, and other subject matter experts from the listed collaborators for this prize competition. Depending on the results of Stage 1, a second stage focused on prototype development may be launched in 2018. Stage 2 would be open to everyone, not just winners of Stage 1, and participants would be invited to submit working monitoring prototypes for evaluation under pilot-, demonstration-, or full-scale conditions. The prize purse for Stage 2 is anticipated to be significantly larger than Stage 1. Reclamation also plans to invite industry and venture capital representatives to participate as technology commercialization scouts at the Stage 2 competition so they can seek potential business opportunities with solvers to commercialize their technologies into market-ready products.

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https://www.usbr.gov/research/challenges/pathogen.html